

Anki & Flashcards: Enhancing Long-term Memory and Self-learning with Spaced Repetition Software

Santiago Betancor Falcón

Universidad de Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain

ABSTRACT

As teachers and researchers of the 21st century, it is imperative that we explore the use of new technologies in the classroom to create methodologies which, in concordance with the research done in fields such as cognitive and educational psychology, may enhance students' innate language learning mechanisms. In the present article we propose the application Anki as an exceptional tool for students to increase their long-term acquisition of new vocabulary and grammar, thanks to the spacing effect. Furthermore, when integrated as autonomous homework into teachers' syllabus, Anki becomes complementary to the communicative practice conducted in the classroom, instilling in students good study habits, self-learning strategies, and the confidence and autonomy necessary for them to take control over their own language learning process. In this paper we conclude that this principle which comes from the realm of cognitive sciences, together with the use of new technologies, are two crucial elements for the creation of new methodologies aiming at enhancing (as well as working in concordance with) the true nature of 2L acquisition.

Keywords: Anki, spaced repetition, self-learning, new technologies, spacing effect, long-term memory, language acquisition, software.

1. INTRODUCTION

The use of flashcards may well be regarded as one of the oldest language learning techniques in history. Its application is very straightforward: the learner takes a piece on paper and writes a word in his/her mother tongue on one side and, on the opposite side, the equivalent word in the target language. Once a deck of these are made, the learner will have to make an effort to recall the translation of the words he/she are learning before turning the flashcard over to check the correct answer.

Yet this may come across as a rather simple learning technique, many have made use of it all throughout history; let us consider for example the case of Giuseppe Gasparo Mezzofanti, an eminent Italian polyglot who as far back as in the XVIII century had already applied this method to learn more than 38 languages.

However, as the up-to-date teachers that we aspire to be, we must take advantage of the new technologies at our disposal to maximize the efficiency of this old learning technique. Thus, in this paper we will present the software Anki¹ as an excellent learning tool, which we should consider incorporating in our syllabus so students can increase their long-term acquisition of new vocabulary and grammar thanks to the spacing effect.

2. ANKI – THEORY AND PRACTICE

2.1. Theory

Anki¹ is an application which allows students to systematize and automatize to a great extent the creation, storage and reviewing of their flashcards. By taking the form of an application software, Anki provides a series of improvements which outdo the rudimentary traditional method of writing words on a piece of paper:

- Anki is free (except for iOS) and available for a wide variety of digital devices.
- Unlimited storage of flashcards.
- The user can review vocabulary at any moment and place, without the need of carrying around a deck of paper cards.
- It allows for the creation of personalized flashcards, which students can add multimedia content to, such as images, gifs, memes, etc.
- It is an app which can be very attractive and ludic to language learners.

Nevertheless, Anki does not only facilitate the usage of this learning technique, it also adds a new characteristic which, according to the relevant literature, optimizes the process of learning and retention of new linguistic content: we are of course talking about the spacing effect. Anki is equipped with an algorithm that widens exponentially the review's intervals. Thus, the learner gets to review the new words exactly at that moment when they are about to forget them.

Within the realm of cognitive and educational psychology, hundreds of studies prove that the time-spaced reviewing of a particular matter results in a greater long-term learning, compared to studying quickly a big amount of information in a short period of time². Furthermore, this learning strategy has a positive effect in various other aspects of acquisition such as memory, problem solving or the extrapolation of what has been learnt to new different contexts³.

However, all these advantages that spaced repetition offers to students may be very difficult to obtain when using decks of paper flashcards. In a study, Kornell⁴ proves that students who used large card decks (which allow for longer intervals in between reviews) learn much more than those who opted for studying with smaller decks (which shorten the space between reviews). This is a problem which we can very easily solve with Anki, since this app allows us to manually adjust the length of intervals, so we make sure they are long enough. Likewise, once properly configured, Anki will automatically organize all flashcards according to this principle, which will save students the arduous and tedious process of distributing cards across time.

As we have seen so far, Anki is the perfect tool for students to make a more efficient and productive use of their time and effort. Nevertheless, after having personally used this software for more than five years, we can vouch for how much discipline Anki requires. This is the reason why we believe that Anki can be also used to instill in our students good daily learning habits and learning strategies, as well as fostering their autonomy.

Yet being scientifically proven the great efficiency of this method, this is not always the most commonly used learning strategy among college students. According to a poll conducted by Kornell et al.⁵, students tend to organize their studying time depending on when the nearest exam is. In this poll, only 11% de 472 students claimed preparing for exams with enough time; likewise, 86% of students admitted not reviewing ever again units' content once they pass the unit's exam.

Kornell explains that these bad habits can sometimes be the product of a cognitive bias, which make students think that massive study is more efficient than spaced study, even though all research proves the opposite to be true. According to Kornell⁴ this happens because when students study with flashcards, they tend to self-evaluate their own performance right away, which pushes them to commit to massive study and to short-term memory in order to get some quick results. However, even if spaced repetition reduces accuracy at first, the truth is that it does develop long-term memorization; the confusion resides in believing that short-term results equal long-lasting acquisition⁴.

This should not be a difficult bias to correct since once we explain students the science behind the spacing effect, many will feel motivated enough to go slowly and work with long review intervals: we can only start solving a cognitive bias if we make it conscious. However, if we were to make sure that our students only use long intervals, we would only need to set Anki's minimal interval to be long enough for this technique to work properly. On the one hand, this method will help students create correct daily learning habits, and on the other hand, once they become aware of the benefits of this method, it will grow in them a new appreciation for long-term studying, a lesson that could potentially change their lives.

With this methodology we will also aim at creating a full integration of both, presential classroom practice and self-learning. In Olga's research⁶ for example, we can already see some positive reactions from students, who felt that this combination

helped them foster in them a “feeling of self-esteem and a bigger linguistic awareness of their own learning process”⁶, which at an affective level will reinforce these new habits.

In the long run, the integration of these concepts will foster the personal development of students, making them not only better language learners, but also more responsible and efficient people: “when learners succeed in developing autonomy, they not only become better language learners but they also develop into more responsible and critical members of the communities in which they live”⁷.

2.2. Practice

In concordance with the theoretical points seen up to this point, this will be our proposal for the use of this application: The students will utilize Anki all by themselves in order to collect and review all the vocabulary and grammar points that will be presented to them during the semester. As learners start adding flashcards, the software will start functioning and it will provide students with a certain number of flashcards to review each day. This will force students to spend around 15 minutes every day on reviewing flashcards and adding new ones from time to time. This simple exercise will bring them abundant benefits to their learning:

- Thanks to spaced repetition, students will take full advantage of their study time and they will develop their long-term memory.
- Students will create good learning habits thanks to daily reviewing and thanks to the creation of their own learning materials (tailored flashcards).
- Students will increase their own autonomy since they will start to see themselves as responsible for their own learning process throughout the school semester.
- Students will learn to utilize interesting and appealing digital resources to complement their presential courses.
- Students will review their flashcards on their own, and in the classroom, they will have plenty of time to put into practice that new grammar and vocabulary thanks to communicative exercises.

Besides this list of advantages, the learner will also learn new studying and learning strategies by using Anki. In this exercise they will be required to create their own flashcards, and they should make them well. Thus, we will use this application to teach them some tricks on how to create their own effective learning materials.

- Students will learn about the importance of using multitude of colors in their flashcards so they have an easier time reading them and retaining the new concepts.
- Students will learn how crucial it is for them to always learn new words and grammatical structures in context by using example sentences, instead of learning the new concepts in isolation.
- Students will learn to get all their senses involved in the learning process by adding images and audio to their flashcards.
- Students will learn to be selective about what and what not to learn, since they should only add to Anki that which they feel they are able to assimilate at their current level, or what is the same: what is and what is not in their zone of proximal development.

Having reached this point, let us see what this project with Anki would look like. As students encounter new words and grammatical structures in the classroom, they will be expected to, little by little, create their own deck of flashcards in Anki. For the creation of these materials students will have to follow four simple rules:

- To use their target language as much as possible to create their flashcards.
- To provide contextualized example sentences for the new words and grammar.

- To use color codes.
- To complement their flashcards with some multimedia content (pictures, audio, memes, etc.).

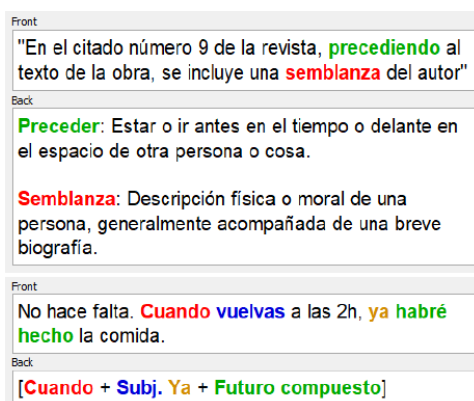


Figure 1. Two examples of flashcards made on Anki.

Every day, Anki will provide students with a certain number of flashcards that they will have to review, so in this way they will start to progressively interiorize the new content. Likewise, students will get used to finding some minutes every day to practice their target language; and they better be consistent with it, for in case they skip one day of practice, the unreviewed flashcards will start to pile up. In this way, students will create this new positive learning habit and they will start improving their long-term memory thanks to the spacing effect.



Figure 2. Settings, summary page and deck browser on Anki.

Every two units, students will have to take an exam to evaluate their acquisition of these units' content as well as their competence in the four language skills. In addition to this, they will have to download their flashcard deck from Anki and hand it in for later evaluation.

In this file, the teacher will get access to all kinds of information that Anki automatically compiles about every student's studying process. In our case we will evaluate the following:

- The quantity of flashcards (stored and still in the process of reviewing).
- The quality of the flashcards (has he/she followed the rules prescribed for the creation of flashcards?).
- Regularity (has he/she reviewed daily? How many days did he/she skip reviewing?).

This is information that will be provided by Anki to the teacher in the form of graphics, which will much facilitate the evaluation process.

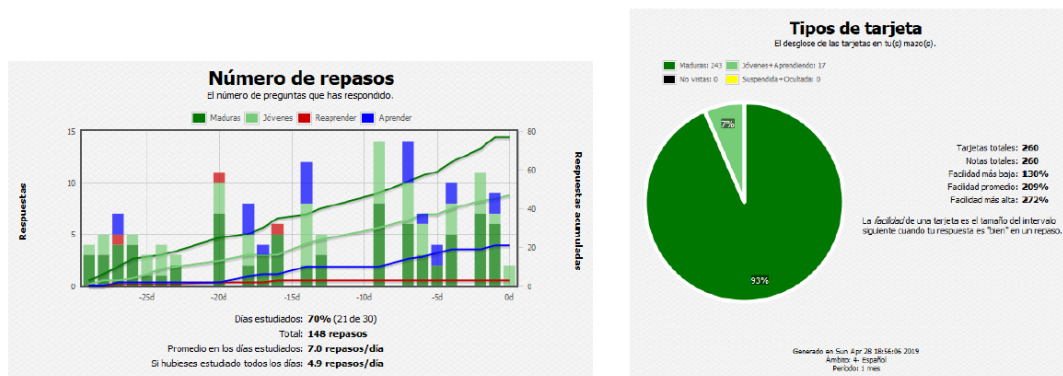


Figure 3. Graphics for review count and card types, examples of statistical information provided by Anki.

3. CONCLUSIONS

As we have seen Anki is an excellent learning tool worth teaching students about. On the one hand, the scientific literature proves this method to enhance learners' long-term memory. On the other hand, Anki's features not only will make it easier for students to take full advantage of this learning technique, but during this process, students will also get to learn a multitude of good learning strategies and habits which will help them become better and more autonomous learners. All this, in combination with the communicative practice conducted in the classroom, will create the perfect conditions for students to acquire their target language in a fast and natural way, for when we work in concordance with the way our brain naturally works, results inevitably improve.

REFERENCES

- [1] Anki, "Ankiweb", <<https://ankiweb.net/about>> (3 October 2019).
- [2] Cepeda, N., Pashler, H., Vul, E., Wixted, J., Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin*. 132(3): 354-80 DOI: 10.1037/0033-2909.132.3.354 <<https://www.ncbi.nlm.nih.gov/pubmed/16719566>> (3 October 2019).
- [3] Kang, S., (2016). Spaced Repetition Promotes Efficient and Effective Learning: Policy Implications for Instruction. *Policy Insights from the Behavioral and Brain Sciences*, 3(1), 12-19. <https://doi.org/10.1177/2372732215624708> <<https://journals.sagepub.com/doi/abs/10.1177/2372732215624708#articleCitationDownloadContainer>> (3 October 2019)
- [4] Kornell, N., (2009). Optimising learning using flashcards: Spacing is more effective than cramming. *Applied Cognitive Psychology*. 23. 1297-1317. 10.1002/acp.1537. <https://www.researchgate.net/publication/227620413_Optimising_learning_using_flashcards_Spacing_is_more_effective_than_cramming> (3 October 2019).
- [5] Kornell, N. y Bjork, R., (2007). The promise and perils of self-regulated study. *Psychonomic Bulletin & Review*. 14. 219-24. 10.3758/BF03194055. <https://www.researchgate.net/publication/6144498_The_promise_and_perils_of_self-regulated_study> (3 October 2019)
- [6] Olga, E., Arumí, M., Dolors M., (2003). Hacia la autonomía del aprendiz en la enseñanza de lenguas extranjeras en el ámbito universitario: el enfoque por tareas como puente de unión entre el aprendizaje en el aula y el trabajo en autoaprendizaje. *Bells: Barcelona English language and literature studies*, 12. <<https://www.raco.cat/index.php/Bells/article/view/82922>> (3 October 2019).
- [7] Benson, Ph., (2001). *Teaching and Researching Autonomy in Language Learning*, London: Pearson Education. <[file:///C:/Users/cash/Downloads/9781315833767_googlepreview%20\(1\).pdf](file:///C:/Users/cash/Downloads/9781315833767_googlepreview%20(1).pdf)> (3 October 2019).